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The Cost of Projected Soviet Strategic Forces

Summary

The magnitude and scope of Soviet development programs for strategic weapon systems would enable the USSR, over the next five years, to begin to replace nearly all the elements of its strategic offensive forces with new systems and significantly improve its strategic defenses as well. If these programs proceed as currently projected by the Intelligence Community in NIE 11-3/8-84/85, they would require average annual growth in outlays for strategic programs of 5 to 7 percent through 1989 and raise the total annual amount expended on the strategic mission to the highest absolute level we have seen in two decades. ()

Spending increases at these rates would be less than the increases in strategic outlays observed during the late 1960s and early 1970s, but a marked departure from the high but relatively flat spending pattern of the past 10 years. Moreover, the Intelligence Community is also projecting expenditures for nonstrategic programs to grow during this period. The Warsaw Pact theater forces projected by the Intelligence Community in NIE 11-14-85 would cause Soviet expenditures for the general purpose mission to grow on average at 3 to 4 percent a year through the end of the decade. Assuming no major change for RDT&E, combined expenditures for the projected strategic and general purpose forces would increase the growth rate of total defense spending to as much as 4 percent a year--a rate that has not been sustained by the Soviets since 1975. Over the past 10 years, total defense spending has been growing at about 2 percent a year. ()

A return to 4-percent annual growth in defense spending would be more burdensome for the Soviets to undertake than in the past. Since 1970, GNP growth has averaged about 2.6 percent compared to 4.5 percent during the earlier periods of high growth in defense spending. Unless the rate of growth in the economy returns to levels comparable to the late sixties and early

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seventies, a 4-percent rate of growth in defense spending would increase the already large defense share of the GNP. (Intelligence Community estimates of the present share range from 13 to 17 percent).

Perhaps more important is the fact that increasing the share of the GNP, and especially the share of machinery output devoted to defense, would run counter to General Secretary Gorbachev's efforts to boost economic growth by increasing the allocation of machinery output to modernizing industry. Although strategic offensive and defensive weapons account for only about one-fifth of total defense spending, they consume a larger share of the high-quality and advanced-technology resources needed for modernizing industry.

NIE

Each projected strategic program is, by itself, probably within Soviet industrial capabilities, but the defense industries may find it difficult to achieve the rate of technological success at both the design and manufacturing stages that will be necessary to meet the aggregate projected deployment targets. In the past, the Soviets minimized the chances for industrial problems through conservative weapons designs that permitted labor intensive manufacturing procedures. New technologies were introduced only when the old ones could not meet a weapon's minimum operational requirements. During the 1970s the Soviets initiated the development of a growing number of systems that incorporated Soviet state-of-the-art technology. This design approach has created new technological and managerial demands on the defense industries that have increased the time required for engineering development and system integration and have created problems in translating laboratory and pilot plant experience into full-scale production. These problems could become more acute through the remainder of the 1980s as the number of strategic and nonstrategic weapons in production that incorporate state-of-the-art technology is expected to increase.

Strategic weapons systems carry a high priority in the Soviet military calculus, and Moscow has already made a substantial resource commitment to many weapons the NIE projects to reach IOC over the next five to 10 years. To moderate the impact of their defense modernization programs on economic and industrial requirements, the Soviets could alter the rate of modernization by delaying, stretching out, or curtailing selected weapon procurement programs and retaining older systems longer. The high absolute level of Soviet expenditures on strategic programs which has been maintained for the past 10 years would allow for substantial modernization of both offensive and defensive forces with little or no increase in the annual rate of growth.

Introduction

This memorandum provides the background and detailed analysis that underlie the military-economic judgments contained in National Intelligence Estimate 11-3/8-84/85, Soviet Capabilities for Strategic Nuclear Conflict Through the Mid-1990s.

The costs are computed in constant prices (1970 rubles) to measure the burden of various defense activities on the economy and to reflect real changes in defense expenditures. The resultant figures are not intended to--and probably do not--reflect the same values that Soviet leaders consider in discussing their defense effort. Moscow presumably would use a more recent price base and might include other categories of spending (for example, investment in defense industries) when considering the cost of defense activities. We believe, however, that our figures are useful for showing changing trends in the pattern of spending as well as in the relative levels of spending for the projected forces. We are in the process of changing the price base for our estimates of both GNP and defense spending from 1970 to 1982.

These estimates of Soviet expenditures on strategic programs include investment and operating costs but do not include the costs of research, development, testing, and evaluation (RDT&E) activities. The data available on Soviet RDT&E outlays and the methodology for calculating them do not permit the aggregate to be broken down by individual programs or specific missions. Nevertheless, we believe that strategic programs account for a sizeable portion of Soviet military research and development efforts because they are, in general, the most technologically sophisticated weapons in the Soviet inventory.

The Projections and Their Costs¹

Five Soviet strategic offensive forces and two strategic defense forces are projected in NIE 11-3/8-84/85, each using a different set of assumptions. These assumptions are enumerated in Table 1.

To assess the impact of these forces on Soviet defense spending and the burden they imply for the Soviet economy, we have estimated their costs. Forces 4 and 5 were excluded from the analysis because they are based on 1983 Soviet and US START/INF negotiating positions which have been overtaken by developments arising out of the recent summit and the ongoing Geneva negotiations. Force 1 -- the SALT-constrained force--is nearly equivalent to Force 2 in terms of total costs and growth (see figure 1), so this paper will focus on two combinations of offensive and defensive forces. These forces will be referred to as the moderate force and the high force.

- The moderate force is based on the NIE's Force 2 for offensive systems, Force A for strategic air defense forces, and a treaty-limited ABM force of 100 launchers.
- The high force is based on the NIE's Force 3 for offensive systems, Force B for strategic air defense forces and a treaty-limited ABM force of 100 launchers. Differences from the moderate force reflect the Intelligence Community's uncertainty over the Soviets' own evaluation of their future strategic requirements. ()

¹ These expenditure estimates are calculated on the basis of the forces projected in NIE 11-3/8-84/85, Soviet Capabilities for Strategic Nuclear Conflict Through the Mid-1990s, 25 April 1985.

Table 1
NIE 11-3/8-84/85 Force Projections

Offensive Forces:

- Force 1 represents a steady upgrade of strategic attack forces, but assumes the Soviets remain within the key quantitative limits of SALT I and SALT II--current levels of strategic nuclear delivery vehicles, MIRVed missile launchers, SSBNs, and SLBM launchers--through 1990.
- Force 2 projects a continuation of what the Community sees as the current Soviet efforts to upgrade their strategic forces, but with no effort to remain within SALT I or SALT II. At this rate it is anticipated that the USSR would exceed the quantitative limits on offensive weapons set by SALT I and SALT II by 1986.
- Force 3 projects a greater level of effort than Forces 1 and 2. It postulates a Soviet decision to improve their strategic capabilities by deploying new systems in larger numbers.
- Forces 4 and 5 represent modernization of Soviet strategic attack forces and assumes that they are constrained by the 1983 Soviet and US START and INF proposals respectively.

Defensive Forces:

- Air defense Force A projects a steady improvement in Soviet ground-based defensive SAMs, lasers, and radars and airborne defenses (i.e., interceptors and AWACs aircraft).
- Air defense Force B projects a more rapid deployment schedule for newer systems.
- Each projection assumes that ABM defenses will remain within the 1972 ABM treaty limit of 100 launchers. For illustrative purposes, the NIE also postulates 3 ABM force projections that exceed treaty limits.

Table 2 describes these two forces in terms of the assumptions made about the major programs associated with each.

We estimate that total investment and operating expenditures for the projected forces would result in average growth in total strategic expenditures of 5 to 7 percent a year through 1989 with a cumulative cost for the period 1985-89 of 83-94 billion rubles. This would represent a sharp upswing in expenditures for the strategic mission, which have shown little or no growth since the mid-1970s.

The projected improvements of intercontinental attack capabilities with introduction of two new or modernized ICBMs, the Blackjack heavy bomber, and the continued construction of Typhoon- and Delta-class SSBNs would account for most of the spending growth (see table 3). Spending on peripheral attack and strategic defense would rise more slowly as several ongoing modernization programs neared completion. (See the appendix for a more detailed description of the costs associated with the two forces).

The moderate and high forces assume that modernization and expansion of the USSR's antiballistic missile (ABM) force will remain within the 100-launcher limit established by the 1972 ABM Treaty. A decision by the Soviets to rapidly expand their ABM defenses above the limit, once the Moscow system is completed in 1987, would be a costly endeavor. It could add 7-10 billion rubles to total strategic outlays for 1985-89 and increase annual spending growth for the strategic mission to 7 to 10 percent. The lower end of the range postulates that the Soviets begin construction of about 1,400 ABM launchers in the western USSR to defend key military, political, and economic targets. The higher end projects construction of a nationwide ABM defense with a deployment goal of about 3,500 launchers.

Table 2

Projected Strategic Programs, 1985-89

Moderate Force

High Force

Major Programs

Intercontinental Attack

ICBM force

- Introduction of SS-25 solid-propellant ICBM with a single RV on road-mobile launchers.
- Introduction of SS-X-24 solid-propellant ICBM with 10 MIRVS, as a replacement for SS-17 and SS-19, on rail-mobile launchers.
- Replacement of existing SS-18 ICBMs with follow-on system having greater accuracy and throw weight.
- More rapid production of SS-18 follow-on and SS-X-24.
- Production of components for SS-X-24 follow-on.
- Introduction of SS-25 follow-on with three MIRVS and improved accuracy.

SSBN force

- Completion of D-IV program at three boats, each carrying 16 SS-NX-23 SLBMs.
- Backfitting of SS-NX-23 missiles into D-III SSBNs.
- Delivery of four additional Typhoon-class boats for a total of 6 deployed by 1989, and one final boat still under construction.
- Production of the SS-N-20 SLBM and the introduction of follow-on with greater accuracy and throw weight.
- A faster construction schedule for Typhoon SSBNs, with six boats deployed and three more under construction by 1989.
- More rapid production of the SS-N-20 and its follow-on.

Bomber force

- Production of AS-15 long-range cruise missile for deployment on newly produced Bear H and Blackjack aircraft.
- Production of a new tanker aircraft based on the IL-76 transport.
- Production of Blackjack heavy bomber.
- More rapid production of the Blackjack, Bear H, and AS-15.

Peripheral Attack

Land-based missiles

- Completion of SS-20 deployment program at 441 launchers.
- Introduction of a more accurate and reliable follow-on to the SS-20.
- Introduction of the SSC-X-4 ground launched cruise missile.
- Completion of SS-20 deployment program at 486 launchers.
- More rapid production of both the SS-20 follow-on and SSC-X-4.

- Sea-based missiles
 - Introduction of two new long-range sea-launched cruise missiles (SLCMs), the SS-NX-21 and the SS-NX-24. About 200 SLCMs, including 50 SS-NX-24s on dedicated submarines, would be deployed by 1989.
 - Faster rate of cruise missile production, with about 360 deployed by 1989.
- Peripheral bombers
 - Continued production of about 15 Backfires a year for the strategic air force.
 - A gradual replacement of old Fencer aircraft with an improved version, with the inventory projected to increase to about 550 aircraft by 1989.
 - A gradual increase in Backfire production for the strategic air force to about 20 a year by 1989.
 - Soviets would forego the expansion of Fencer program in anticipation of a new aircraft that will not be ready for series production till after 1989.

Strategic Defense

- Interceptor aircraft
 - Continued deployment of the MIG-31 Foxhound and the introduction of two new aircraft, the SU-27 Flanker and MIG-29 Fulcrum, with 700 of the new aircraft deployed by 1989.
 - Increase in the deployment of the MIG-31 and MIG-29 but the deployment of fewer of the larger and more expensive SU-27.
- Strategic SAMS
 - Construction of about 110 new SA-10 sites by 1989.
 - Introduction of a new laser weapon for air defense in 1989.
 - Construction of about 165 new SA-10 sites by 1989.
 - Introduction of new laser in 1987, with about 10 deployed by 1989.
- Warning and control
 - Deployment of 23 Mainstay AWACS by 1989.
 - Deployment of 30 Mainstay AWACS by 1989.

Table 3

Projected Cumulative Costs of Selected Major Offensive
Weapon Programs, 1985-89

	Billion 1970 Rubles ^a
ICBMs	
SS-18 Follow-on	1.9 - 2.4
SS-X-24 ^b	2.2 - 3.2
SS-25 ^b	2.5 - 3.4
IRBMs	
SS-20 follow-on	2.8 - 3.2
SLBMs	
SS-N-20, on Typhoon SSBN	2.9 - 3.2
SS-NX-23, on D-IV	2.7 - 3.3
Bombers and cruise missiles	
Blackjack	2.1 - 3.6
Bear H	1.5 - 2.0
Backfire	2.8 - 3.0
AS-X-15	.5 - .7
SS-NX-21	.7 - 1.4
SSC-X-4	.6 ^c
SS-NX-24	.9 - 1.7
Total Strategic Offense	40 - 49 ^d

^a The range in costs reflect differences between the moderate and high force projections.

^b Includes costs associated with all modifications and follow-on systems.

^c Differences between the moderate and high force projections are negligible.

^d Includes costs for systems not listed in Table.

The Projections in Historical Context

The rates of growth in expenditures for these illustrative moderate and high forces, while substantial, would not be unprecedented when compared with past upswings in Soviet expenditures for the strategic mission. They would, however, represent a marked departure from the relatively flat spending pattern of the past 10 years and would result in absolute spending levels for the strategic mission higher than we have seen in 20 years. [REDACTED]

We estimate that from 1965 through 1984 the Soviets spent approximately 250 billion rubles on strategic programs--about one-fifth of all their defense expenditures in that period. Spending on the strategic mission was fairly evenly divided between offensive and defensive programs, with each accounting for about 45 percent of cumulative strategic outlays. The remaining 10 percent was allocated to strategic command and control activities and the production of nuclear materials and devices. [REDACTED]

As figure 2 shows, spending on strategic programs has fluctuated considerably since 1965, rising and falling in response to investment programs. During this period, two modernization efforts produced upswings in strategic outlays--a push to modernize the offensive forces between 1966 and 1970 that enabled the Soviets to overtake the United States in the number of strategic nuclear delivery vehicles, and a two-year spurt during 1973 and 1974 because of the initiation of a series of concurrent modernization programs. Since 1975, outlays for the strategic mission have remained fairly constant, but at an absolute level high enough to have enabled the USSR to triple its number of deliverable weapons. [REDACTED]

The Major Upswings

During 1966 to 1970, program expenditures for all Soviet strategic forces increased on average by about 9 percent a year. This was nearly twice the

growth rate of total defense expenditures (including RDT&E) and by 1970 the strategic mission's share of total outlays had increased to more than 25 percent. []

Spending for the intercontinental attack mission, the major driver of this upswing, grew at an average rate of about 20 percent a year. This intense resource commitment enabled the Soviets to overtake the United States in the number of strategic nuclear delivery vehicles, although they still had fewer deployed nuclear warheads for strategic operations. Between 1966 and 1972, the Soviets:

- o Deployed 1,400 new ICBM silos for the SS-9, SS-11, and SS-13 third-generation systems and procured over 2,000 ICBMs.
- o Constructed 20 Y-class SSBNs (each of which carries 16 SS-N-6 SLBMs) and procured about 500 SLBMs. []

Spending on strategic defense rose in the late 1960s by roughly the same 9-percent annual rate as the total strategic mission. These funds enabled the Soviets to deploy an ABM defense around Moscow consisting of 64 above-ground missile launchers and supporting radars. The Soviets also expanded and improved their air defenses, adding some 400 SA-3 and SA-5 SAM sites by 1972 and beginning series production of two new air defense interceptor aircraft--the MIG-23 Flogger and MIG-25 Foxbat. The number of deployed interceptors declined, however, as older models were replaced on a basis of less than one for one. []

Soviet spending on programs for peripheral strategic attack declined through 1970 and then experienced a modest upturn through 1972. The Soviets

spent most of this money maintaining a force of 677 launchers for the medium range SS-4 and intermediate range SS-5 ballistic missiles and about 800 medium bombers for strategic strikes along the periphery of the Soviet Union. Procurement of most of these weapons had been completed prior to 1966. After 1970, costs for this mission began to increase gradually because of the production of the Backfire bomber.

In 1973 and 1974, strategic force outlays again spurted upward as the Soviets undertook major improvements in their intercontinental attack forces. During this two-year period the Soviets:

- ° Completed construction of 13 SSBNs.
- ° Started to replace their SS-11 mod 1 ICBMs with two new, more capable versions.
- ° Started series production of components for a new generation of ICBMs--the SS-17, SS-18, and SS-19.

The Mid-1970s Spending Plateau

The high but relatively level pattern in strategic expenditures after 1974 roughly coincided with a slowing in both total Soviet military procurement and overall Soviet defense spending. The slower growth in investment and operating costs involved all four major categories of strategic and conventional weapons--missiles, ships, aircraft, and land arms (figure 3). Each of the major missions--strategic, general purpose, and support--also experienced a slower rate of growth after 1976, but the strategic mission was the only one that demonstrated a decline in its resource allocations (figure 4).

We do not know what caused the plateau, but the magnitude and duration of the shift in procurement growth rates, as well as its pervasiveness among all the forces, suggest strongly that it was not merely a temporary response to unanticipated economic, technical, or manufacturing problems. Because of rapid growth in defense spending during the 1966-76 period and the broad-based modernization that resulted, the Soviets may have decided to develop their forces more selectively during the late 1970s and early 1980s. Such a decision could have been influenced by the fact that the economy in the mid-1970s was entering a period of generally slower growth. Another consideration may have been that the technical requirements of future military systems necessitated upgrading both the research and development and the manufacturing bases with a concurrent slowdown in weapons procurement.

Soviet industry faced increasing difficulty during the 1970s in producing the weapons needed to compete with the improved capabilities of Western weapons then under development or entering service. In the mid-1970s, for example, expansion of Soviet strategic defense interceptor and SAM forces with the weapons systems then available would have had only a marginal impact on their ability to counter Western bombers and cruise missiles attacking at low altitudes. The Soviets may have judged that continued procurement of large numbers of simpler weapons could not adequately deal with the evolving threat and opted instead to reduce procurement in the near term while positioning themselves through industrial modernization to be more competitive in the long term.

Whatever the causes for the leveling of procurement expenditures, the high absolute level of the USSR's spending still permitted the Soviets to introduce an impressive array of highly capable weapons in large quantities. In the strategic forces, between 1975 and 1985 the Soviets tripled their

deployed reentry vehicles (RVs) and bomber weapons for strategic operations-- from about 4,000 warheads to about 12,000. They also continued their long-standing campaign to improve strategic air defenses by building a large and sophisticated defensive network with good capability against aircraft penetrating at medium and high altitudes. Specific modernization programs included:

- o Replacement of 800 older ICBM launchers with launchers for three new systems: the SS-17, SS-18, and SS-19. The new missiles are more accurate, carry MIRVs, and are deployed in more survivable silos.
- o Continued "front end" improvements--improved RV packages and guidance and control units--to the SS-17, SS-18, and SS-19 missiles.
- o Deployment of 25 D-class SSBNs, which carry the intercontinental-range SS-N-8 and SS-N-18 submarine-launched ballistic missiles, and 3 Typhoon class SSBNs which carry the SS-N-20 missile.
- o Deployment of about 380 SS-20 Intermediate-Range Ballistic Missile (IRBM) launchers and 130 Backfire bombers with the strategic air forces.
- o Continued replacement of older air defense interceptors with the MIG-25 Foxbat and MIG-23 Flogger and the introduction of the MIG-31 Foxhound in 1982.
- o Continued deployment of SA-3 and SA-5 SAMs and the introduction of the SA-10 in late 1980.

Economic Implications of the Projections

Since 1975, Soviet GNP has increased at an average annual rate of 2.6 percent, compared with 4.5 percent during the 1966-75 period. Growth in almost every sector of the economy has turned downward (see figure 5) at a time when problems with the design and manufacture of technologically advanced weapon systems have been identified in the defense industries. The forces projected in the National Intelligence Estimate therefore have serious implications for the burden of defense on the Soviet economy. Any sustained increase in spending for strategic programs will put upward pressure on total defense spending growth. The extent of that pressure will depend on growth in Soviet spending on their nonstrategic programs:

- ° If spending on nonstrategic programs increases at an average annual rate of about 2 percent--the same rate as total defense spending since 1976, but somewhat less than that observed for nonstrategic programs--the projected growth in strategic spending would cause the annual growth rate in total defense spending to increase to between 2.5 to 3 percent.
- ° The force levels projected by the Intelligence Community for Warsaw Pact theater forces in National Intelligence Estimate 11-14-85, however, imply growth in nonstrategic programs of 3 to 4 percent. This growth, together with the projected growth in strategic programs, would result in an increase in the

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growth rate of total defense spending to as much as 4 percent per year.² [REDACTED]

The Soviets could accomodate an acceleration in defense spending growth if they were to achieve the rather ambitious economic growth objectives outlined in the 12th Five Year Plan--annual average GNP growth of 3.5 percent. Most Western observers, however, expect the economy to grow more slowly. Moreover, because General Secretary Gorbachev has made modernization the centerpiece of his domestic policy, an annual rate of growth in defense of 4 percent would affect other economic objectives more adversely than in the past. The two previous upswings in spending on strategic programs coincided with periods of steady growth in the economy--5-percent growth in the GNP in the late 1960s and 4 percent in the mid-1970s. In contrast, if the GNP continues to grow by the average rate of the 1981-84 period--about 2.5 percent--by 1989 a 4-percent rate of growth in total defense spending could result in a 1 to 2 percentage point increase in the already large defense share of GNP of 13 to 14 percent (measured in constant ruble prices and using a US definition of outlays for defense).³ [REDACTED]

The consequences of a Soviet decision to accelerate the growth of total defense expenditures in the late 1980s would be even greater than the defense-to-GNP ratio implies because defense competes for many of the same resources that are critical to Gorbachev's plans for promoting economic growth through a rejuvenation of the industrial base. Strategic weapons carry a high priority

² This judgment is based on NIE 11/14-85, Trends and Developments in Warsaw Pact Theater Forces, 1985-2000, September 1985. [REDACTED]

³ DIA believes that when measured in current ruble prices, the defense share of GNP is 14-17 percent. [REDACTED]

for the Soviets and are less likely to be affected by economic factors. Nevertheless strategic programs consume a large share of such high quality resources. For example, the finer tolerances and consistency of replication necessary for the series production of pulse-Doppler radars and onboard computers for the new interceptor aircraft require precision machinery, such as computerized timing and control devices and wafer-handling equipment. Computerized machinery and the accompanying software necessary for the mass production of advanced microelectronic components are already in short supply in the Soviet economy. A sharp increase in investment on strategic weapons would also entail the use of critical materials, such as high-strength steels and titanium alloys, that could otherwise be used in the production of turbine components and cutting tools for modernizing the country's industrial base.

[REDACTED]

Potential Technological and Manufacturing Problems

Each projected strategic program is, by itself, probably within Soviet industrial capabilities, but the defense industries may find it difficult to achieve the rate of technological success at both the design and manufacturing stages that will be necessary to meet the aggregate deployment targets in either scenario. [REDACTED]

During the 1960s, the availability of technology was not a significant constraint on either the development or production of Soviet weapons. The dominant Soviet approach was to upgrade weapon capabilities through the gradual introduction of new technology. Most systems contained evolutionary changes from their predecessors. This practice entailed the use of many components of earlier weapons, limiting the system to a single mission, and achieving high reliability through common subsystems, redundancy, and ease of maintenance. New technologies were introduced only when proven and when the

old technologies could no longer meet minimum operational requirements. This approach was successful because it allowed Soviet industry to produce these systems in large numbers with minimal risk.

During the 1970s the Soviets began to alter their development practices, initiating a number of innovative weapon designs that incorporated Soviet state-of-the-art technology. This new approach has increased the time required for system integration, testing, and production assimilation. It has also generated new manufacturing requirements, including:

- Computerized equipment and the accompanying software to manufacture complex parts and achieve the higher tolerances necessary for new weapons.
- Computerized testing equipment for microelectronic components and subassemblies.
- High-quality materials--including silicon, gallium arsenide, and germanium--for microelectronics production.
- Composite materials like graphite fiber structures that permit the construction of components that have low weight but strength equal to or better than those components manufactured with traditional materials.
- Highly skilled labor to operate more sophisticated production processes at the component, subassembly, and final assembly stages.⁴

⁴ As Soviet production technology becomes more sophisticated and the role of unskilled and semiskilled workers declines, there will be a need for extensive training programs for computer programmers, designers, inspectors, and shop workers.

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- ° More and different support industries for individual programs as system integration becomes more complex.⁵ [REDACTED]

There is evidence that since the mid-1970s the Soviets have encountered difficulties in both the development and production of a number of major strategic weapon systems. Some of the more expensive programs experiencing delays in development include:

- ° The SS-X-24 ICBM. [REDACTED]
[REDACTED]
[REDACTED] we believe that the Soviets had planned to start full-scale production of a medium size solid-propellant ICBM in the late 1970s. Because of difficulties in developing a solid-propellant rocket motor of this size, such an ICBM--the SS-X-24--will not be ready for series production before 1986.
- ° The SS-N-20 SLBM. This missile, deployed on Typhoon-class SSBNs, did not reach initial operating capability (IOC) until 1983, because of problems with its solid-propellant motor. This was a year after the first Typhoon had completed sea trials and when the

weapon system should have been fully operational.

- ° Large phased-array radar. Planned as an integral part of the Soviet ballistic missile early warning system, these six radars have experienced several serious technical problems, which have delayed completion. The Pechora radar has been damaged by fire three times in testing, most recently in 1981. Authorized for construction in 1973 at [REDACTED]
[REDACTED]
[REDACTED] the radar probably will not achieve operational status until after 1986.
- ° SA-10 missile system. [REDACTED]
lead us to believe that development problems-- especially in the propulsion, guidance, and autopilot systems--delayed the missile's deployment by two to three years.
- ° SH-8 ABM interceptor. Flight tests began in 1973, but the system has not yet been deployed because of problems with both the missile and supporting electronics.⁶ [REDACTED]

There are also a number of weapon programs that have entered series production but are proceeding at a pace slower than we have observed for similar systems in the past. Moreover, we have good evidence that while the

Soviets themselves had initially planned to deploy them at relatively slow rates, some of these programs have fallen behind these deployment schedules. For example, [REDACTED] Soviet plans to reequip its fighter regiments with its three newest fighter aircraft--the MIG-31 Foxhound, MIG-29 Fulcrum, and SU-27 Flanker--had by 1985 fallen behind schedule by a year or more. These delays can be traced at least partly to production problems stemming from increased manufacturing complexity. The airframes are more complex structures using non-metallic composite materials, their avionics systems are based on new technologies, and they represent the Soviets' first use of turbofan engines on fighters. [REDACTED]

It is uncertain to what extent such problems will persist through the remainder of the decade as the number of new weapon systems incorporating Soviet state-of-the-art technology increase. On the one hand, the Soviets have made some impressive advances in upgrading their manufacturing base. In the aircraft industry they have modernized most facilities, particularly those manufacturing such advanced aircraft as the Flanker, Fulcrum, and Foxhound fighters and their missile armament; the Blackjack bomber; and the Condor transport. The average level of manufacturing technology in the missile, space system, shipbuilding and tank industries has improved substantially as well. The high rate of expansion in assembly floorspace--which in the USSR is usually accompanied by the installation of new manufacturing equipment--suggests that increasingly advanced equipment is being employed in many production lines in these industries. [REDACTED]

Such impressive advances may not have kept pace with the demands of new weapon systems, however, and some industrial disruptions almost certainly will persist into the 1990s. There is, for example, a continuing potential for production resource competition between strategic and nonstrategic programs [REDACTED]

that draw on similar, if not the same, production resources at the component and subassembly levels. Future production decisions might require the Soviets to make some hard choices when assigning priorities to individual programs and missions. Moreover, because of the specialization and newness of the technologies the Soviets have concentrated them in production processes that support defense programs, with little or no counterpart production in the civilian economy. Even when comparable components, such as general purpose electronics, are produced in the civilian sector, the quality of output is often too low for use in military equipment. The Soviets may consequently find it increasingly more difficult to rely on civilian resources to compensate for shortfalls in the production of components and subassemblies for advanced weapons.

Finally, while the projections in the estimate take into consideration technological and manufacturing problems we have been able to identify, they generally make no allowance for new problems that may arise. If the Soviets experienced problems in a major new program, such as the Blackjack heavy bomber, and initial deployment is delayed by a year or more, procurement costs would drop accordingly, although such delays would almost certainly add to the RDT&E costs of the programs.

Outlook

Strategic systems carry a high priority in the Soviet military calculus, and Moscow has already made a substantial resource commitment to many of the weapons projected to reach IOC over the next five to 10 years. The rate of modernization may be increasingly affected however, by technical and economic considerations. To moderate the impact of economic and industrial constraints the Soviets could make several adjustments that would alter the rate of

strategic force modernization. They could:

- Extend the service life of some older systems by refurbishing missiles or reducing the operating times for SSBNs and aircraft.
- Delay scheduled force modernization and stretch out selected weapon procurement programs.
- Curtail early some weapon procurement programs, either retaining older systems longer or accepting some reduction in overall force size as the quality of the force improves.
- Reduce some costly training activities and make greater use of training simulations.

Such adjustments would not require the Soviets to forego either the modernization of their forces or the achievement of their military objectives. As has been the case for the past 10 years, the high current level of Soviet expenditures on strategic programs would allow for a substantial modernization of both Soviet offensive and defensive strategic forces even with little or no increase in the annual rate of growth.

An arms control agreement that imposed limitations on US force modernization could allow the Soviets to slow the rate of their own force modernization while ensuring that the strategic balance did not shift in favor of the United States. The USSR probably attaches little economic importance to arms control in the near term. An agreement that imposed deep reductions on both sides, however could eventually result in significant cost savings for the Soviets. These savings probably would be realized only in the long term

because nearly all of the projected programs are in process and several will be ready to begin series production within the coming year. [REDACTED]

The Soviets would also find an arms control agreement a useful mechanism for managing and planning their modernization efforts over the longer term because it would impose a measure of stability and predictability on US strategic plans for the nineties. The uncertainties of the nature and extent of possible changes in US strategy and force posture compound the complexities of Soviet decisionmakers as they consider their economic strategy to the year 2000. Major new US strategic initiatives in an unconstrained environment could add billions of rubles to what will be an already high Soviet defense bill. The Soviets are particularly sensitive to the prospect of an open-ended high-technology arms competition that could result from the US Strategic Defense Initiative (SDI). It is too early to assess accurately the cost to the Soviets of responding to SDI. We estimate, however, that a nationwide terminal ballistic missile defense alone--3,500 missile launchers and supporting radars--would cost the Soviets some 30 billion rubles and increase cumulative strategic expenditures over the next 10 years by about one-fifth.



Appendix

Cost Analysis

Under each of the two force scenarios, resource allocations for all major strategic force components would grow. Most of the impetus for overall growth in spending, however, would come from efforts to modernize the intercontinental attack forces.

Intercontinental Attack

Under the moderate force, Soviet spending in 1989 for intercontinental attack would be about two-thirds greater than the level of 1984, growing at between 10 and 11 percent a year (figure 6). This would be a dramatic reversal compared with the last 10 years, when spending for intercontinental attack forces declined steadily by about 4 to 5 percent a year. (Spending on total strategic offense also declined during this period by about 1 to 2 percent, even though outlays for peripheral strategic attack were increasing). The acceleration in spending is based on our expectation that several Soviet programs, now in either development or testing, will begin series production by 1989 (table 4). Under the high force, Soviet expenditures for the intercontinental attack mission could grow by as much as 15 percent a year. The increase reflects the added investment the Soviets would make to enhance both the survivability and the destructive potential of their intercontinental attack forces.

ICBMS

Modernization of the ICBM force would be the major cause of the rapid increase in costs projected for intercontinental attack programs. Investment would dominate as the Soviets began series production of two new solid-fueled

Table 4

Projected Intercontinental Attack Program, 1985-89

Moderate Force

High Force

ICBM Force

- Introduction of SS-25 solid-propellant ICBM with a single RV on road-mobile launchers.
- Introduction of SS-X-24 solid-propellant ICBM with 10 MIRVS, as a replacement for the SS-17 and SS-19, on rail-mobile launchers.
- Replacement of existing SS-18 ICBMs with follow-on having greater accuracy and throw weight.
- More rapid production of SS-18 follow-on and SS-X-24.
- Production of components for SS-X-24 follow-on.
- Introduction of SS-25 follow-on with three MIRVS and improved accuracy.

SSBN Force

- Completion of D-IV program at three boats, each carrying 16 SS-NX-23 SLBMs.
- Backfitting of SS-NX-23 missiles into D-III SSBNs.
- Delivery of four additional Typhoon-class boats for a total of 6 deployed by 1989, and one final boat still under construction.
- Production of the SS-N-20 SLBM and the introduction of follow-on with greater accuracy and throw weight.
- A faster construction schedule for Typhoon SSBNs, with six boats deployed and three more under construction by 1989.
- More rapid production of the SS-N-20 and its follow-on.

Bomber Force

- Production of AS-15 long-range cruise missile for deployment on newly produced Bear H and Blackjack aircraft.
- Production of a new tanker aircraft based on the IL-76 transport.
- Production of Blackjack heavy bomber.
- More rapid production of the Blackjack, Bear H, and AS-15.

missiles (the SS-X-24 and SS-25), which are either being flight tested or in the early stages of series production, and a follow-on to the SS-18 that evidence indicates is in development. The cost to operate the force would also increase somewhat as they deployed the new solid-fueled missiles on mobile launchers, making them more costly to man and maintain than comparable silo-based missiles. Under the moderate force, spending on ICBMs would more than double by 1989, growing at about 20 percent a year. Under the high force, the Soviets would increase the deployment of each of the three new missiles and deploy a more accurate version of the SS-X-24. They would also begin series production of components for a follow-on to the SS-X-24 and a follow-on to the SS-25. Under this force, expenditures would nearly triple by 1989. [REDACTED]

SSBNs

Under the moderate force, spending growth would be uneven, declining as the last of three D-IV-class SSBNs is completed around 1986. Costs would then start to increase as the Soviets started production of a follow-on to the SS-N-20 SLBM (currently deployed on Typhoons) and began construction of the lead ship of a new class of SSBN with a projected completion date around 1992. On average, Soviet expenditures on SSBNs would increase by about 2 percent a year. Under the high force the Soviets would undertake a faster construction schedule for both the Typhoon and the new class of SSBN with a subsequent increase in the production of the SLBMs they will be deployed with. This additional investment would result in a steady growth in outlays of 4 to 5 percent a year. [REDACTED]

Bombers. The Soviets are reemphasizing the intercontinental attack role of their strategic bombers; this force is undergoing its first major modernization since the early 1960s. The reemphasis began in 1984 with the [REDACTED]

initial deployment of the AS-15 long-range cruise missile on Bear H aircraft and is expected to continue with the deployment of the Blackjack heavy bomber in either 1988 or 1989. Under the moderate force, Soviet spending on the heavy bomber force would double by 1989 and account for one-quarter of all outlays for intercontinental attack, compared with about 3 percent prior to the start of Bear H production in the early 1980s. Under the high force, production of both the Blackjack and Bear H bombers would be accelerated and spending would nearly triple. The bomber forces would account for nearly one-third of Soviet outlays for intercontinental attack programs in 1989.

Peripheral Attack

Under the moderate force, spending for the peripheral attack mission would increase by about 4 percent a year through 1989 (figure 7). In absolute terms, projected spending in 1989 would be about 25 percent greater than in 1984. Spending on land-based systems would increase as the Soviets introduce a follow-on to the SS-20 IRBM and began deploying long-range ground-launched cruise missiles (GLCMs) by late 1985 or 1986 (table 5). The Soviets are also expected to begin deploying sea-launched cruise missiles (SLCMs) on submarines by 1985, increasing the sea-based share of peripheral attack outlays from about 3 percent in 1984 to about 15 percent in 1989. In contrast, spending on peripheral attack bombers would stay about the same, as the transfer of Fencer aircraft to strategic aviation is completed and Backfire production continues at the current rate of about 15 aircraft a year.

Under the high force, spending for peripheral attack programs would grow steadily through 1989 at 6 to 7 percent a year. The added costs would result primarily from the deployment of an additional 45 launchers for the SS-20 and a faster rate of production of the SS-20 follow-on. The Soviets would also

Table 5

Projected Peripheral Attack Programs, 1985-89

Moderate Force

High Force

Land-Based Missile Force

- ° Completion of SS-20 deployment program at 441 launchers.
 - ° Introduction of a more accurate and reliable follow-on to the SS-20.
 - ° Introduction of the SSC-X-4 ground launched cruise missile.
- ° Completion of SS-20 deployment program at 486 launchers.
 - ° More rapid production of both the SS-20 follow-on and SSC-X-4.

Sea-Based Missile Force

- ° Introduction of two new long-range sea-launched cruise missiles, the SS-NX-21 and the SS-NX-24. About 200 SLCMs, including 50 SS-NX-24s on dedicated submarines, would be deployed by 1989.
- ° Faster rate of cruise missile production, with about 360 deployed by 1989.

Bomber Force

- ° Continued production of about 15 Backfires a year for the strategic air force.
 - ° Gradual replacement of old Fencer aircraft with an improved version, with the inventory projected to increase to about 550 aircraft by 1989.
- ° A gradual increase in Backfire production for the strategic air force to about 20 a year by 1989.
 - ° Soviets would forego the expansion of Fencer program in anticipation of a new aircraft will not be ready for series production till after 1989.

produce more long-range SLCMs, with these programs accounting for one-quarter of the outlays for peripheral attack in 1989. Spending on peripheral bombers would remain at about the 1984 level, although the Soviets would gradually increase Backfire production for the strategic air forces to about 20 aircraft a year by 1989. [REDACTED]

Strategic Defense

Under the moderate force, Soviet spending on strategic defense programs would grow by about 3 to 4 percent a year through 1989 (figure 8). This would break the trend of the past 10 years when spending grew by less than one percent a year. The Soviets would make major improvements in their ability to engage current bombers at low altitudes and, to a lesser extent, cruise missiles (table 6). They would deploy two new aircraft, the MIG-29 Fulcrum and the SU-27 Flanker, and continue to produce the MIG-31 Foxhound for their air defense forces. Under this force, the Soviets would continue to construct new SA-10 sites at the current pace, with about 160 deployed by 1989. They would also improve their warning and surveillance capabilities, primarily with the deployment of the new A-50 Mainstay early warning and control aircraft. Finally, the Soviets would continue to upgrade their ballistic missile defense around Moscow within the 100-launcher limit established in the 1972 ABM Treaty. This limited modernization would be largely completed by 1987. [REDACTED]

[REDACTED] Under the high force, a more rapid deployment of new items and a slower phaseout of some older SAMs and interceptor aircraft--primarily, an acceleration in new SA-10 site construction, with about 215 deployed sites by 1989--would result in average annual growth in spending of 5 to 6 percent. In addition, the Soviets would introduce a ground-based high-energy laser for strategic air defense by 1987. [REDACTED]

TOP SECRET

Table 6

Projected Strategic Defense Programs, 1985-89

Moderate Force

High Force

Interceptor Aircraft

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|--|---|
| <ul style="list-style-type: none">° Continued deployment of the MIG-31 Foxhound and the introduction of two new aircraft, the SU-27 Flanker and MIG-29 Fulcrum, with 700 of the new aircraft deployed by 1989. | <ul style="list-style-type: none">° Increase in the deployment of the MIG-31 and MIG-29 but deployment of fewer of the larger and more expensive SU-27. |
|--|---|

Strategic SAMs

- | | |
|--|---|
| <ul style="list-style-type: none">° Construction of about 110 new SA-10 sites by 1989.° Introduction of a new laser weapon for air defense in 1989. | <ul style="list-style-type: none">° Construction of about 165 new SA-10 sites by 1989.° Introduction of new laser in 1987, with about 10 deployed by 1989. |
|--|---|

Warning and Control

- | | |
|--|--|
| <ul style="list-style-type: none">° Deployment of 23 Mainstay AWACS by 1989. | <ul style="list-style-type: none">° Deployment of 30 Mainstay AWACS by 1989. |
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